RUDRAPRASAD CONSULTANTS

NAME OF WORK: Improvements to Roads and Drains at Thindlu and Kodigehalli Surrounding Areas in Ward No.09 Kodigehalli

DETAILED PROJECT REPORT

SUBMITTED TO B.B.M.P, BANGALORE

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BRUHAT BENGALURU MAHANAGARA PALIKE

DETAIL PROJECT REPORT

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RUDRAPRASAD CONSULTANTS BANGALORE

Rudraprasad consultants
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Assistant Executive Engineer
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INTRODUCTION

CHAPTER – 1

INTRODUCTION

Detailed Project Report

1.1 General

India's pride, Bengaluru is nearly 500 years old and has grown from a small time settlement when KempeGowda, the architect of Bengaluru, built a mud fort in 1537 and his son marked the city boundaries by erecting four watch towers. Bangalore is the capital and the largest city of Karnataka. It is also called "Garden City" for its beautiful gardens, flowers and trees which flourish in each and every street. Bangalore is India's third largest city, fifth most populous city and fifth-most populous urban agglomeration. The majority of the city of Bangalore lies in the Bangalore Urban district of Karnataka and the surrounding rural areas are a part of the Bangalore Rural district. In recent days Bangalore has transformed itself from a "pensioners' paradise" to a modern thriving "cosmopolitan metropolis". Today Bengaluru has grown well beyond those four towers into a sprawling metropolis of more than 6 million people and is referred to as the "Silicon Valley" of India.

As a large and growing metropolis, Bangalore is home to many well-recognized colleges and research institutions in India. Numerous public sector heavy industries, software companies, aerospace, telecommunications, and defence organizations are located in the city. Bangalore is also well known as a hub for India's Information Technology sector. It is among the top 10 preferred entrepreneurial locations in the world. Bangalore is a major economic and cultural hub and the second fastest growing major metropolis in India. Today 35 percent of India's software export is done at Bangalore. Rapid population growth in Bangalore was brought about by the IT and other associated industries, leading to an increase in the population to about 1.5 million, with an annual growth rate of 10-14%.every year.

Bangalore today is obviously one of the most sought after cities in the country with the rapid growth in the IT industry and other associated industries the rise in the number of job opportunities in the city. With the rising population in the city there is also a corresponding increase in the number of vehicles in the city. Bangalore's vehicular traffic has increased manifold, with 1.6 million registered vehicles in the city — the second highest for an Indian city, after New Delhi. Bangalore in particular is that there is very little scope for expansion of

roads and the need to use existing roads for smoothmovement of vehicles is even more pronounced. It thus becomes mandatory for the administration to ensure better parking facilities. With the increase in population and the expansion of the city, the problem of connectivity of the populace has arisen. Quite obviously personalized modes of transport have grown at a tremendous rate and two wheelers along with the cars. The maintenance and construction of roads to address the growing traffic in the city has been a challenge to the BDA and the BBMP. Development of the city road infrastructure has revolved around imposing one-way traffic in certain areas, improving traffic flow in junctions, constructing ring roads, bridges, flyovers and other grade separators.

Bangalore's road network exceeds 3,000 km (1,800 mi) and consists of ring roads, arterial roads, sub-arterial roads and residential streets. The city road network is mainly radial, converging in the centre. Many of Bangalore's erstwhile colonial and town streets were developed into commercial and entertainment areas after independence. The B.V.K Iyengar Road became the retail hub of Bangalore, while MG Road, Commercial Street and Brigade Road became important shopping, recreation and corporate areas. But for MG Road, other roads in and around the erstwhile Parade Ground remain narrow, winding roads. The unplanned nature of growth in the city resulted in massive traffic gridlocks that the municipality attempted to ease by constructing a flyover system and by imposing one-way traffic systems. Some of the flyovers and one-ways mitigated the traffic situation moderately but were unable to adequately address the disproportionate growth of city traffic. Some of the flyovers and one-ways mitigated the traffic situation moderately; however the volume of traffic continues to grow at an annual rate of between 7- 10%. The Outer Ring Road was initially constructed to ease truck congestion in the city; however the growth of suburbs reduced the positive impact of the ring road. BDA is laying additional lanes on many of the major roads around Bangalore. The Peripheral Ring Road is designed to be concentric to the Outer Ring Road and covers 108.9 km. The Hosur Road, which connects Bangalore to the Electronics City, is heavily congested and is part of the National Highway (NH7), therefore witnesses' heavy truck traffic as well.

Export Promotional Industrial Park (EPIP) in Bangalore is the place which entrepreneurs love to be identified with. EPIP is in the just next door of M/s ITPL, an internationally acclaimed technology park promoted by KIADB with TATAs and Singapore consortium of industries.

This park comes with state-of-the-art infrastructure facilities. Following are the few of many features of this prestigious location

- Location in unpolluted, lush green atmosphere, just 17 Kms. from the heart of the city and 9 Kms. from Bangalore Airport.
- Total extent of developed land is 547 acres with well-laid asphalted roads & drainage systems.
- Assured water supply & dedicated power lines with Sodium Vapor street lighting.
- KTPO Exhibition Complex coming up in the area. Hospital with ultra modern facilities and well-equipped inland container depots.
- Well connected with public transport with host of secondary infrastructure facilities like telephones, Posts & Telegraph, Banks, ATMs, Convention center. Cafeterias, Travel operators.

EPIPs are the destination for industrial units who have plans to export at least 33% of their output in value offshore. These parks come with well-planned infrastructure, which is hallmark of KIADB's service. These parks are established with the sanction of Union Govt, of India to give impetus to growth of exports in the state. Government of Karnataka offers host of incentives and concessions to export oriented units.

The Bruhat Bengaluru Mahanagara Palike (BBMP, Greater Bangalore Municipal Corporation vide Government of Karnataka Notification no. UDD 92 MNY dt: 2.11.2006) is in charge of the civic administration of the city. It was formed in 2007 by merging 100 wards of the erstwhile Bangalore Mahanagara Palike, with seven neighbouring City Municipal Councils (Rajarajeshwari Nagara, Dasarahalli, Bommanahalli, Krishnarajapuram, Mahadevapura, Byatarayanapura and Yelahanka), one Town Municipal Council (Kengeri) and 111 villages around Bangalore. The BBMP Is run by a city council composed of 250 members, including 198 corporators representing each of the wards of the city. The BBMP works with the Bangalore Development Authority (BDA) and the Agenda for Bengaluru Infrastructure and Development Task Force (ABIDe) to design and implement civic projects.

The BBMP has taken up an ambitious plan to upgrade Arterial & Sub Arterial Road network in these newly added areas of BBMP and Development, maintenance and management of high quality network in EPIP zone roads at Mahadevapura Zone, where the traffic intensity has increased significantly and to augment the capacity for safe, efficient and free flow of

traffic. Roads in and around EPIP zones are being upgraded to arterial road standards which will result in enormous increase in the traffic. Tech city, a preferred choice of many global corporations to position their businesses. It has indeed been a challenge to the government agencies including the urban local bodies to meet up with these unprecedented demands and challenges of the global companies and its citizens demanding international class 'citizen services'.

The project consists of improvements to roads and drains, in ward 09 of Byatarayanapura Division, which includes 17 roads. The existing roads need to be improved, since they are not in good condition and to avoid inconvenience to people living in these wards. The total length of all Drains in ward 09 is 220.0 m (0.220 Km) & the total length of all Asphalt Roads in Ward 09 is 993.0m (0.993 Km).The ward maps in which the respective roads are highlighted are enclosed with this report.

1.2 Topography

Bangalore is situated in the southeast of Karnataka, at an average elevation of 920m above mean sea level. It is positioned at 12.97°N, 77.56°E and covers an area of 2, 190 sq.km. Bangalore Urban District borders with Kolar District in the northeast, Tumkur District in the northwest, Mandya District in the southwest, Chamarajanagar District in the south and the neighboring state of Tamil Nadu in the southeast. The Bangalore Urban District is divided into three taluks; Bangalore North, Bangalore South, and Anekal. The Bangalore North taluk is a relatively level plateau, while the Bangalore South taluk has an uneven landscape with intermingling hills and valleys.

1.3 Project objective

- The main objective of the study is to establish the technical & economical viability of the project roads by rehabilitation, strengthening, asphalting, concrete including culverts and improvements of side drains of the existing roads.
- The detailed project study includes submission of the detailed project report for the project as per standards.

1.4 Outline of the project

The consultant is required to conduct various engineering Surveys, Investigate, Carry out Detailed Design and Viability of the project. **Prepare Detailed Project Report**, based on Detailed Design and Bill of Quantities.

1.5 Contents of Detailed Project Report

This Detailed Project Report is submitted in 8 chapters dealing with different aspect of the study of the project road.

Chapter description

1	Introduction
2	Socio-Economic Profile
3	Description of project
4	Methodology
5	Design Standards
6	Pavement Overlay design
7	Conclusion
8	Cost estimate

DESCRIPTION OF PROJECT ROADS

CHAPTER - 2

DESCRIPTION OF PROJECT ROADS

2.1 General

The project consists of bad roads in Ward No.9, Byatarayanapura Division, which includes 17 roads in. The existing roads need to be improved since there are formation of Cracks, Rutting and Potholes which are a hindrance to the free movement of traffic, in turn causing inconvenience to the people of the respective wards. The total length of all Drains in ward 09 is 220.0 m (0.22Km) & The total length of all Asphalt Roads in Ward 09 is 993.0 m (0.993Km), Majority of roads pass through residential and commercial area. Below are the lists of the bad roads in their respective wards.

- **List of Roads**
- **List of Roads in Ward No. 09 (VMS Layout)**
- VMS Layout - 1st Main Road
- VMS Layout - 2nd Cross Road
- VMS Layout - 1st Cross Road
- **List of Roads in Ward No. 09 (Bank Colony)**
- Bank Colony- Main Road
- Bank Colony- 1st Cross Road
- Bank Colony- 2nd Cross Road
- Bank Colony- 2nd cross Road
- **List of Roads in Ward No. 09 (Hanuman Badavane)**
- Hanuman Badavane - 3rd Cross Road
- Hanuman Badavane - 4th Cross Road
- Hanuman Badavane - 5th Cross Road
- Hanuman Badavane - 6th Cross Road
- **List of Roads in Ward No. 09 (Buddha Jyothi Layout)**
- Buddha Jyothi Layout - Main Road
- Buddha Jyothi Layout - 1st Cross Road
- Buddha Jyothi Layout - 1st CrossRoad -1st Cross Road
- Buddha Jyothi Layout - 1st Cross Road- 2nd Cross
- Buddha Jyothi Layout - 1st Cross Road-3rd Cross

- Buddha Jyothi Layout - 1st Cross Road- 4th Cross

2.2 Existing project roads

2.2.1 Terrain

Terrain is classified by general slope of the country across the alignment, based on this criterion majority of the project roads pass through Plain terrain.

2.2.2 Alignment

The existing roads have the carriage widths varying from 3 m to 5.6 m and the existing gradients of the project roads are within acceptable limits as per IRC: 86. Table 1 shows the list of project roads with their carriage way widths.

2.2.3 Climate

Due to its elevation, Bangalore enjoys a pleasant climate throughout the year, with temperatures ranging between 33°C and 16°C, with an average of 24°C. The summer heat is moderated by occasional thunderstorms and squalls. Bangalore receives adequate rainfall of about 860 mm from the Northeast Monsoon as well as the Southwest Monsoon. The wettest months are August, September and October.

2.2.4 Carriageway Width

The existing carriageway width varies from 3 m to 5.6 m. Details of carriageway width are as shown in Table 2.1 below,

Table 2.1 - LIST OF ROADS WITH THEIR CARRIAGE WAY WIDTHS

Sl.No	Name of the Road	Carriage Way Width in m
	Ward No.09	
	VMS Layout	
1	1st Main Road	5.60
2	2nd Cross Road	4.00
3	1st Cross Road	4.00
	Bank Colony	
4	Main Road	5.60

5	1st Cross Road	5.00
6	2nd Cross Road	4.70
7	2nd cross Road	4.30
	Hanuman Badavane	
8	3rd Cross Road	3.00
9	4th Cross Road	3.50
10	5th Cross Road	3.60
11	6th Cross Road	4.00
	Buddha Jyothi Layout	
12	Main Road	4.60
13	1st Cross Road	4.20
14	1st CrossRoad -1st Cross Road	4.20
15	1st Cross Road- 2nd Cross	4.20
16	1st Cross Road-3rd Cross	4.50
17	1st Cross Road- 4th Cross	4.70

2.2.5 Pavement Condition

The existing pavement conditions are analyzed based on visual inspection as per IRC 81-1997 Table -1. The Roads as per the Visual Inspection were found to be in Good to Poor condition. This may be due to improper material in subgrade, compaction or movement of heavily loaded trucks. The summaries of pavement condition obtained by visual inspection are listed in Table 2.2 below.

TABLE 2.2: PAVEMENT CLASSIFICATION BASED ON VISUAL INSPECTION

Sl.No	Name of the Road	Road Condition
	Ward No.09	
	VMS Layout	
1	1st Main Road	Poor
2	2nd Cross Road	Poor
3	1st Cross Road	Poor
	Bank Colony	
4	Main Road	Poor
5	1st Cross Road	Poor

6	2nd Cross Road	Poor
7	2nd cross Road	Poor
	Hanuman Badavane	
8	3rd Cross Road	Poor
9	4th Cross Road	Poor
10	5th Cross Road	Poor
11	6th Cross Road	Poor
	Buddha Jyothi Layout	
12	Main Road	Poor
13	1st Cross Road	Poor
14	1st CrossRoad -1st Cross Road	Poor
15	1st Cross Road- 2nd Cross	Poor
16	1st Cross Road-3rd Cross	Poor
17	1st Cross Road- 4th Cross	Poor

2.2.6 Land Use along the project highway

Land use along majority of roads is predominantly for built up area. The settlements are used for residential and commercial purposes.

2.3 Traffic flow conditions

Traffic on these project roads is of mixed type. Majority of roads only carry passenger vehicle most of the time, and there are also commercial vehicles ply on some roads. Commercial vehicles include 2-axle and 3-axle trucks and LCVs.

The intensity of traffic on this stretch is likely increase in future, the reason being:

- The Bangalore Mahanagara Palike became Bruhat Bangalore Mahanagara Palike after inclusion of 7 CMC, 1TMC & 111 Villages adjoining to the CMC areas vide Government of Karnataka Notification No. UDD 92 MNY 2006 dated 02.11.2006. To provide better transport facility, to improve the quality of urban civic services better roads are needed. At present the existing roads in these newly added areas are narrow without proper Drainage, Footpath, and Culverts etc. The BBMP has taken up an

ambitious plan to upgrade Arterial & Sub Arterial Road network in these newly added areas of BBMP in view of providing better infrastructure.

- Roads in and around EPIP zones are being upgraded to arterial road standards which will result in enormous increase in the traffic.
- The number of commercial and residential plots in the given area is high.
- Rising traffic congestion is one of the key issues in the City. Though the length of roads available is good, the problem lies with the restricted widths.

2.4 Cross Drainage Structures and Side Drains

There are no major CD structures along the project road except for the cross roads. The condition of the existing CD structures is good.

2.5 Utilities

- **HT Lines**
  HT lines do not cross along the project roads
- **Light Poles**
  Large numbers of light poles are present along the project roads in regular intervals

2.6 Trees

The project roads consist of trees beside the carriageway at regular intervals. Also tree pits are constructed for all the trees on either side of the roads for watering the trees. Curb stones are laid all round the tree pits for protection

CONCLUSION

CHAPTER - 3

CONCLUSIONS

3.1 General

The primary data collected from the site provides a clear picture of the site conditions, and also gives us a good insight about the deficiencies and the scope for improvements. The primary data coupled with the good engineering expertise lead us in giving apt and economical recommendations for the improvements. A budget of Rs. 1,00,00,000/- (Rs. One Crore Only) has been allocated for this project. Hence, the provisions of items made in the cost estimate are in consensus with the allocated budget. The improvement proposal includes the following:

3.1.1. Geometric Improvements:

- Improvements of existing carriageway
- Improvements to cross sectional elements
- Improvements to horizontal alignment
- Improvements to longitudinal profile

3.1.2. Strengthening of Existing Pavements:

- **Pavement Overlay design**
- Road Drainage
- Road Furniture and Appurtenances
- Pedestrian Facilities
- Aesthetics

The summary of improvement proposals along the project roads in Ward no.09 Conforming to Design Standards with all the Relevant Details such as Length and Width of existing roads, Plans and Construction Costs has been prepared. The details of improvement proposals are discussed in subsequent sections.

3.2. Improvement proposal for Carriageway

Since the majority of the roads are Arterial and sub-arterial roads where the Traffic intensity is less than 10msa, Table 3.1 shows the improvement proposals and pavement composition for the existing roads.

TABLE 3.1: IMPROVEMENT PROPOSAL AND PAVEMENT CONDITION DETAILS

FLEXIBLE PAVEMENT

Sl.No	Name of the Road	BC (mm)
	Ward No.09	
	VMS Layout	
1	1st Main Road	40
2	2nd Cross Road	40
3	1st Cross Road	40
	Bank Colony	
4	Main Road	40
5	1st Cross Road	40
6	2nd Cross Road	40
7	2nd cross Road	40
	Hanuman Badavane	
8	3rd Cross Road	40
9	4th Cross Road	40
10	5th Cross Road	40
11	6th Cross Road	40
	Buddha Jyothi Layout	
12	Main Road	40
13	1st Cross Road	40
14	1st CrossRoad -1st Cross Road	40
15	1st Cross Road- 2nd Cross	40
16	1st Cross Road-3rd Cross	40
17	1st Cross Road- 4th Cross	40

3.3. Improvement Proposal for Side Drains

Adequate drainage is a primary requirement for maintaining the structural soundness and functional efficiency of a road in addition to preserving the valuable road assets created. Pavement structure including subgrade must be protected from any ingress of water, otherwise over a period of time it may weaken the sub grade by saturating it and cause

distress in the pavement structure. Hence, rapid dispersal of water from pavement and sub grade is a basic consideration in road design. Also, quick drainage takes away the water from pavement's surface and reduces chances of skidding of vehicles.

The requirements of road drainage are essentially based on IRC: SP-42-" Guidelines on Road Drainage" and IRC:SP-50 -"Guidelines on Urban Drainage". Camber of 3.0 is provided for the carriageway. For longitudinal drains, a minimum longitudinal gradient of 0.3 percent shall be ensured for satisfactory drainage.

3.4. Improvements Related to Utility, Road Furniture and Appurtenances

Utility and Importance of the Road are greatly enhanced by installing Road Furniture and Appurtenances at appropriate locations along the Project Road, which ensures Improved Road Safety. Planning and Design of Road Furniture and Appurtenances are as per the Guidelines stipulated in IRC. Detailing of each of these Components has been done so that to integrate the same with the Road Improvement Scheme.

COST ESTIMATES

CHAPTER - 4

COST ESTIMATES

4.1. Detailed Cost Estimate

Detailed cost estimate for various works listed in "Improvements to Roads and Drains at Thindlu and Kodigehalli Surrounding Areas in Ward No.08 Kodigehalli" has been worked out based on detailed engineering design.

4.2. General

Cost Estimate is an important part of the DPR as it provides vital input to financial evaluation of the project. The cost estimates have been prepared for strengthening of the existing road, repairs and improvements to longitudinal drains, road furniture and appurtenances.

4.3. Basic rates

As part of Detailed Project Report, Rate Analysis of each of the item has been prepared by adopting PW, P & IWTD SR 2018-19, Bangalore Circle. The rates as given in PW, P & IWTD SR are to be enhanced by 6% for additional weight age for the works to be executed under extra ordinary conditions for Bangalore Metropolitan Limits. Items not covered in NHSR / PW, P & IWTD SR have been based on market rates.

4.4. Utility Relocation

Provision of 1.5% of Construction cost is made in the cost estimated for raising and or shifting electric supply lines, telephone lines, OFC lines and other utilities.

4.5. Project Management and Quality Control

Provision of 2.0% of Construction Cost has been made towards Cost of DPR Preparation, PMC and Proof Checking.

4.6. Project Cost

The total project cost for ***Preparation of DPR for*** "Improvements to Roads and Drains at Thindlu and Kodigehalli Surrounding Areas in Ward No.09 Kodigehalli" is 1,00,00,000.00 and the Detailed Cost Estimate is enclosed.

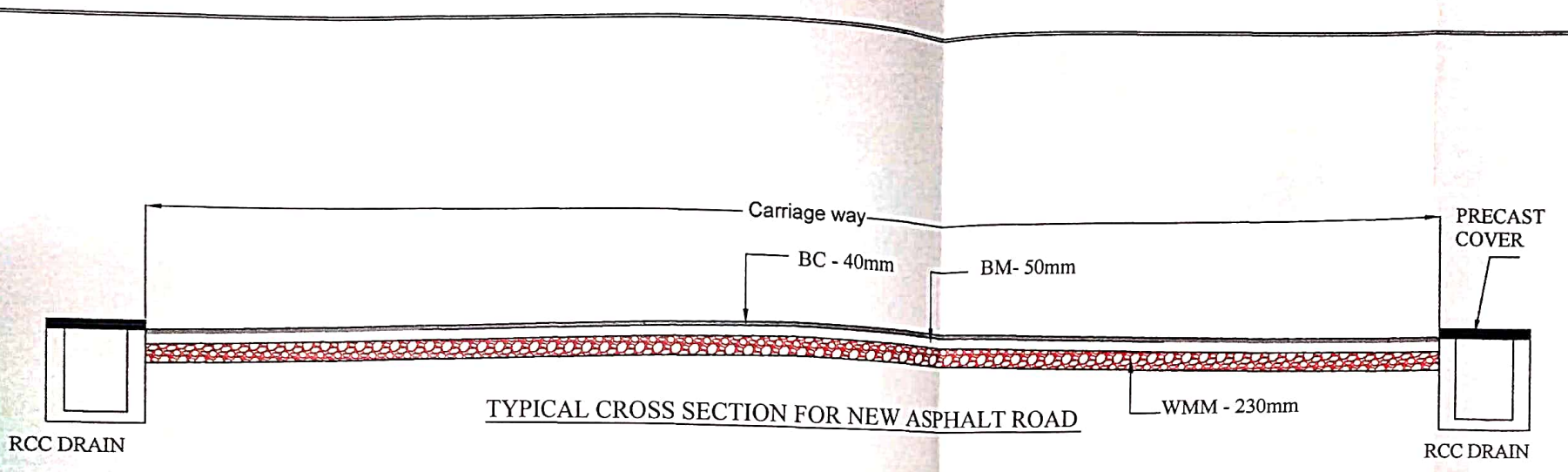
DETAILED ESTIMATE

DRAFT TENDER SCHEDULE

BILL OF QUANTITIES

ANNEXURES

TYPICAL CROSS SECTION



TYPICAL CROSS SECTION FOR NEW ASPHALT ROAD

TYPICAL CROSS SECTION OF RCC DRAIN

1) Do Not Scale The drawing
2) All the Dimensions Are In MM

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REV No	REV DATE	REMARKS
-	-	-

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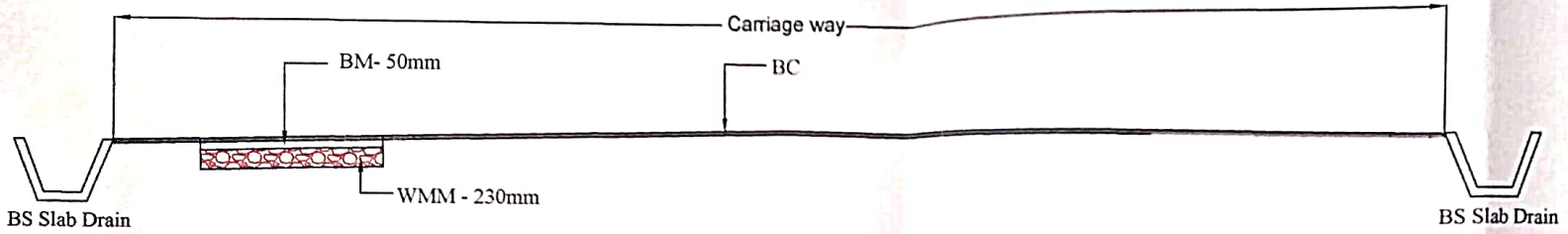
PROJECT	Improvements to Roads and Drains at Thindlu and Kodigehalli Surrounding Areas in Ward No.09 Kodigehalli
CLIENT	B.B.M.P
TITLE	TYPICAL CROSS SECTION OF ASPHALT ROAD
DESIGN	R. KARTHIK RECHAN B.E, M.Tech, (P.A)
CHECKED	R. RUDRAPRASAD M.E, PGDBA, FIV, FIE
DRAWN	AISHWARYA V
SCALE	NTS
REV.	R0



TYPICAL CROSS SECTION FOR RECONSTRUCTION OF ROAD CUT PORTION

1) Do Not Scale The drawing
2) All the Dimensions Are In MM

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REV No	REV DATE	REMARKS

RUDRAPRASAD CONSULTANTS
STRUCTURAL ENGINEERS, ARCHITECTS
& PROJECT MANAGEMENT CONSULTANTS

PROJECT: Improvements to Roads and Drains at Thindlu and Kodigenahalli Surrounding Areas in Ward No.09 Kodigenahalli

CLIENT: B.B.M.P

TITLE: TYPICAL CROSS SECTION OF C.C ROAD

DESIGN: R. KARTHIK RECHAN

CHECKED: R. RUDRAPRASAD

Drawn: AISHWARYA V

SCALE: NTS | REV: R0

ROAD PHOTOGRA PHS

IMPROVEMENTS TO ROADS AND DRAINS AT THINDLU AND KODIGEHALLI SURROUNDING AREAS IN WARD NO.09 KODIGEHALLI

Rudraprasad Consultants
Structural Engineers, Architects &
Project management consultants

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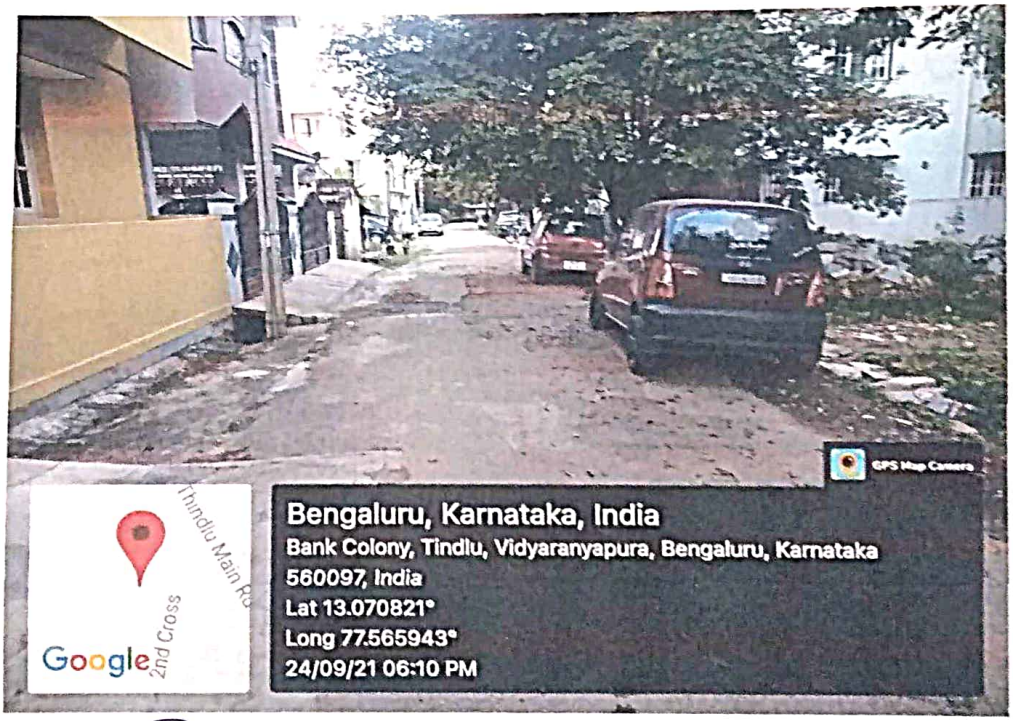
IMPROVEMENTS TO ROADS AND DRAINS AT THINDLU AND KODIGEHALLI SURROUNDING AREAS IN WARD NO.09 KODIGEHALLI



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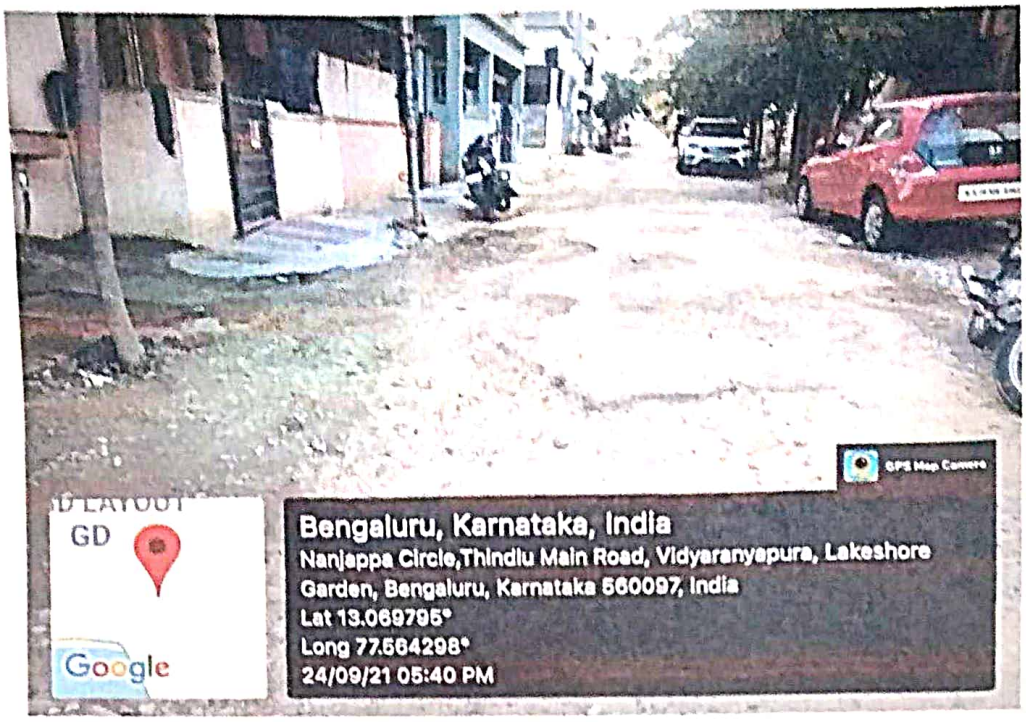

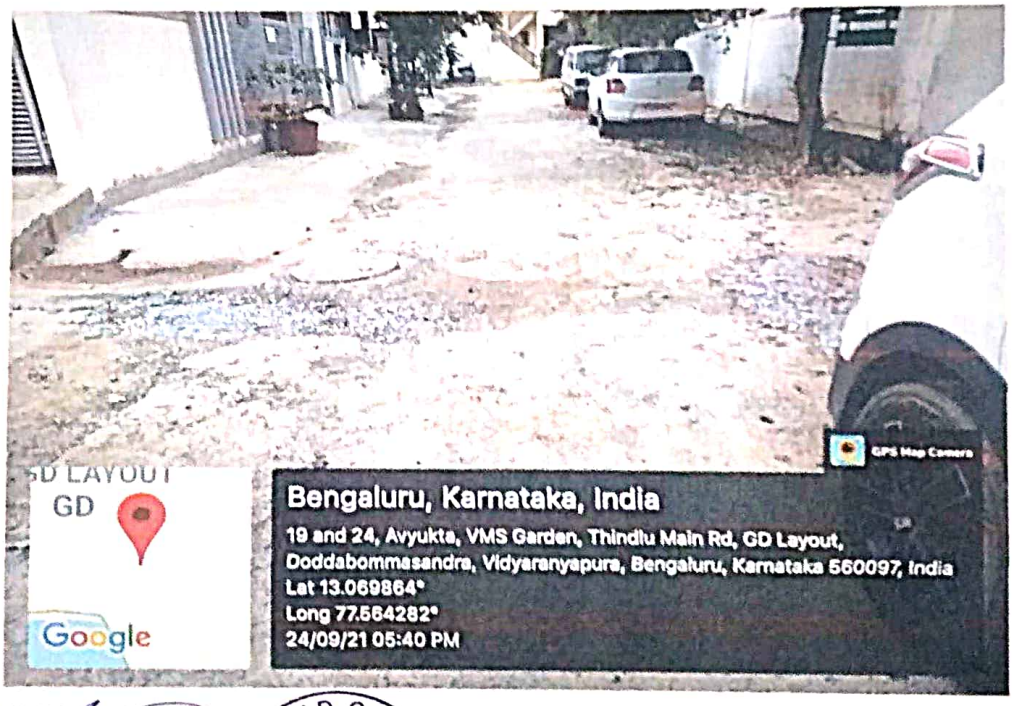
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Lat 13.069864°
Long 77.564282°
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IMPROVEMENTS TO ROADS AND DRAINS AT THINDLU AND KODIGEHALLI SURROUNDING AREAS IN WARD NO.09 KODIGEHALLI

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WARD MAP

BRUHAT BENGALURU MAHANAGARA PALIKE

9-VIDYARANYAPURA

RKP

RAGHAVAPRASAD CONSULTANTS BANGALORE

KEY MAP

IMPROVEMENTS TO ROADS AND DRAINS AT THINDLU AND KODIGEHALLI SURROUNDING AREAS IN WARD NO.09 KODIGEHALLI

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BANGALORE

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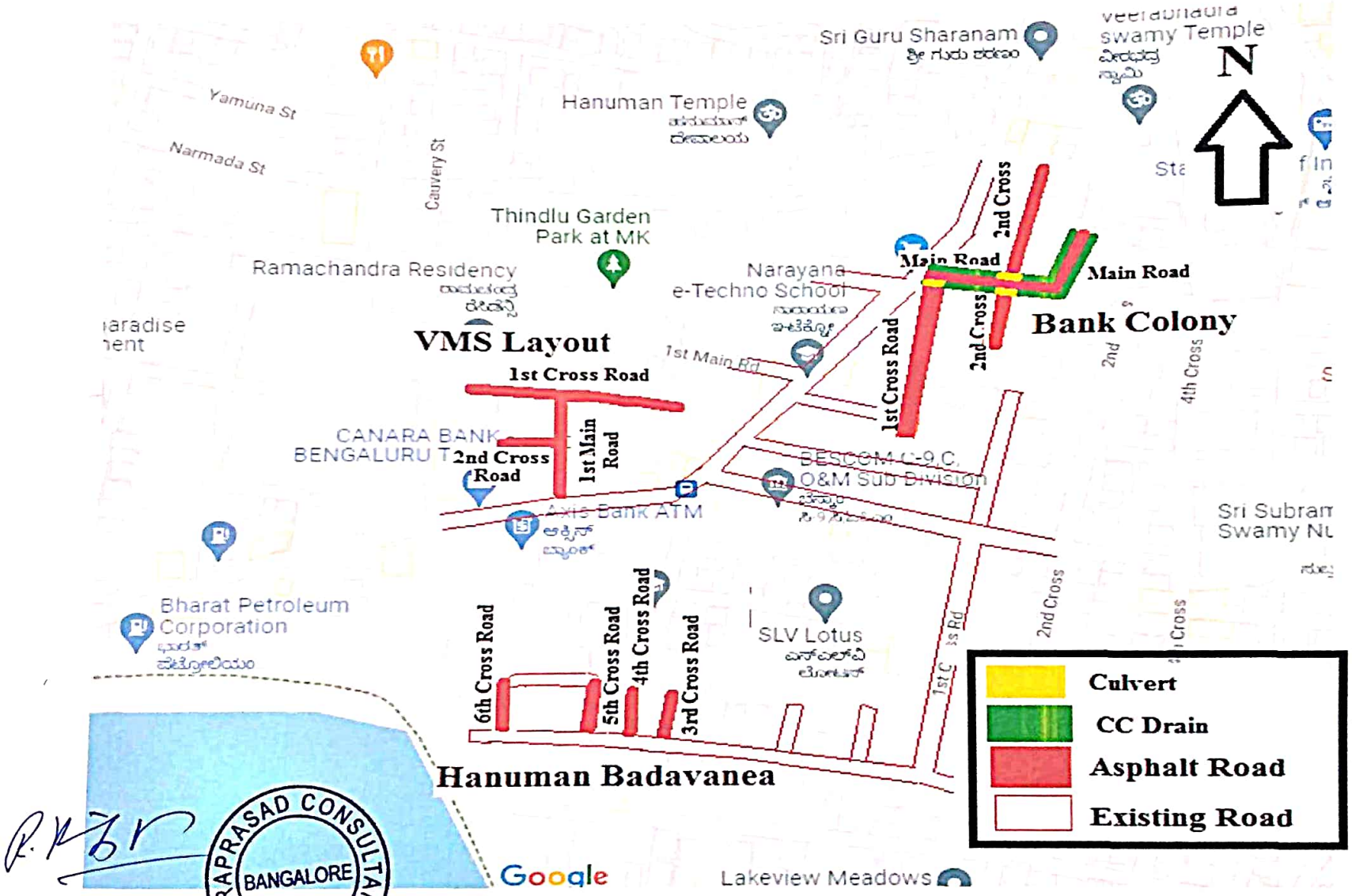
IMPROVEMENTS TO ROADS AND DRAINS AT THINDLU AND KODIGEHALLI SURROUNDING AREAS IN WARD NO.09 KODIGEHALLI



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